DOCUMENT RESUME

ED 385 225 IR 017 235

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TITLE Equity Issues in the Star Schools Distance Learning Program.
INSTITUTION Southwest Regional Lab., Los Alamitos, CA.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE Apr 95
CONTRACT RP92168001
NOTE 15p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco, CA, April 18-22, 1995).
PUB TYPE Reports - Evaluative/Feasibility (142) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Access to Education; Disadvantaged Youth; *Distance Education; Educationally Disadvantaged; Elementary School Students; Elementary Secondary Education; *Equal Education; High School Students; Interactive Video; Junior High School Students; Middle Schools; *Minority Groups; Needs Assessment; Poverty; Program Evaluation; Rural Areas; Student Characteristics; Supplementary Education; Urban Areas; Urban Youth
IDENTIFIERS Middle School Students; *Star Schools

ABSTRACT

The Office of Educational Research and Improvement of the Department of Education has provided funding for four cycles of 2-year Star Schools distance learning projects. This report is based on the second-year findings of a congressionally mandated evaluation of the Star Schools initiative. The Star Schools program focuses on elementary and secondary school students and targets underserved populations through distance learning. Questions about equity have assumed major importance in the Star Schools program and are the focus of this report. The equity issue is approached by describing the characteristics of students at schools served in the 714 Star Schools. Information from observation, document review, and the Common Core of Data (CCD) indicate that few minority and poor high school students in urban areas received full courses in mathematics, science, and foreign languages through Star Schools. These students were more likely to receive supplementary Star Schools courses, while full courses were more common in rural areas where equity objectives were more likely to be met. The question of whether the distribution of Star Schools learning opportunities actually reflects educational needs requires further study. Three tables present study findings. (Contains 10 references.) (SLD)

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Equity Issues in the Star Schools Distance Learning Program

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AERA Annual Meeting
San Francisco, CA

April 1995

IR017235

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INTRODUCTION

During the past decade, new communication delivery technologies have proliferated. Such technologies include satellites with microwave receivers, fiber-optic and coaxial cable television, teleconferencing systems, fax machines, and nationwide computer networks. Simultaneously, several independently organized efforts have attempted to use these "distance learning" technologies to deliver what they intended to be high quality experiences to elementary and secondary school students and teachers. These efforts exist at local, county, and regional levels and involve audiographics; two-way computer conferencing with audio interaction; instructional television fixed service (ITFS); one-way broadcast or point-to-point audio, data, and video, with the possibility of audio return; and microwave, two-way point-to-point audio, data, and video transmission. Each technology, with its strengths and limitations, continues to be used in various localities to increase student access to learning opportunities, but there is no consistency across the nation.

The federal government, through what is known as the Star Schools Program Assistance Act (20 U.S.C. 4081), has encouraged:

> improved instruction in mathematics, science, foreign languages, and other subjects, such as literacy skills and vocational education...to serve underserved populations, including disadvantaged, illiterate, limited-English proficient, and disabled students through distance learning technologies. (Education Acts Amendments, PL 102-103 Aug. 17, 1991)

The Office of Educational Research and Improvement (OERI) of the U.S. Department of Education has provided funding for four successive cycles of two-year Star Schools projects. At this stage in the development of the new communication-delivery technology, it is appropriate to assess the early efforts supported by federal funds. Indeed, Congress recognized the importance of such a study by including a requirement for an evaluation of the Star Schools Program in the 1991 reauthorization. The congressionally mandated report, submitted in July 1993, summarized the first year of a two-year evaluation of Star Schools being carried out by the Southwest Regional Laboratory (SWRL) and Abt Associates Inc. (AAI). This paper is based on the second-year findings of the evaluation study.

Until this evaluation, much research on distance learning has focused on such issues as whether students achieve as well through distance learning as through regular classrooms (Moore, 1989; Clark, 1983); the types of students for whom distance learning is a successful delivery system (Moore, 1990; Atman, 1990); the skills needed by distance learning teachers (Hackman & Walker, 1990) or the cost-effectiveness of distance learning. However, this research has two limitations. First, most of it focuses on college-age or adult learners (Moore, Wilson, & Armstead, 1986; Minninger 1993). The Star Schools program, in contrast, has a central focus on elementary and secondary school students. Second, and perhaps more important, previous

research assumes an educational model in which students will have access to a similar learning experience, either through distance learning or through more traditional means. But the Star Schools program was developed to address a very different issue. It exists because some school-age populations are "underserved," either as a result of individual characteristics, e.g., educational dsadvantage, or because of where they live, e.g., in isolated rural areas.

Research and evaluation concerned with distance learning programs for elementary and secondary school students should not only assess the extent to which students learn important subject matter, but also whether the programs increase equal educational opportunity for students. The focus on student learning presents a major evaluation challenge. Put simply, the distance learning program provides opportunities to students who otherwise would have no access to the type of courses offered. Consequently, evaluators can find no comparison group. Students like those participating in the program do not receive similar courses offered by other means; students who receive such courses through other means differ in fundamental ways from those receiving distance learning courses. As a result, questions about equity assumed major importance in the evaluation of the Star Schools distance learning program and are the focus of this paper.

The equity issue is approached by describing the characteristics of students at schools served through the Star Schools distance learning program as well as the types of programs available to students with particular characteristics. The paper concludes with a discussion of the policy issues raised by these findings, along with a discussion of policy mechanisms that could be used to ensure that the equity objectives of the Star Schools Program are achieved.

METHODOLOGY

This paper draws on three sources of information. First, projects provided descriptions of the courses or modules they offered and the names of schools in which they were offered. These descriptions provided the framework for understanding the differences in experiences offered to students in settings that differed from one another. At the time of the evaluation, the Star Schools distance learning projects served 714 schools. Of these, the most were high schools, followed by elementary schools and then middle schools. (Because some Star Schools projects are downloaded through cable systems in some communities, additional schools may receive programming. However, the numbers reported are those that are "officially" involved in Star Schools activities.)

Second, information about the characteristics of schools was gathered from the National Center for Education Statistics' Common Core of Data (CCD) tape. SWRL placed the CCD identifying number with the names of participating schools in a database and entered relevant information about them that was extracted from the tape. The tape includes information about the percent white (reversed to percent minority) and students eligible for free and reduced price lunch. Unfortunately, the CCD does not identify schools as isolated, rural schools so no numerical data related to that construct are reported.

However, the CCD information was supplemented by the third source of information, case study research that took place during the 1993-94 school year. Two-person teams visited each Star Schools project and conducted interviews with all key staff members. Visits typically lasted two days. Visits were also made to over 30 schools. Using a stratified, probability-proportional-to-size sample, schools were selected randomly, with more schools chosen from the projects serving a greater number of schools. At least three schools were visited from each project.

During the two-day visits, two-person teams observed classes and interviewed school staff, including the principal, teachers or facilitators involved in Star Schools-sponsored activities, and other staff. School staff members who are not directly involved in Star Schools were interviewed to provide information about how they see the distance learning program fitting into the school as an organization.

School demographics were reflected in the supplemental courses, offered in elementary and middle schools. The high school courses were stand-alone courses for advanced students and those studying foreign languages. The site visits revealed that although the students were likely to reflect the racial or ethnic characteristics of the school as a whole, it was impossible to tell whether they reflected the socioeconomic characteristics as revealed by the poverty measure used.

FINDINGS RELATED TO EQUITY

The Star Schools program authorization extends the definition of disadvantaged used in the Elementary and Secondary Education Act (ESEA), Chapter 1, a program designed to improve opportunities for educationally disadvantaged children. Star Schools uses the phrase "underserved populations" to include, among others, students in isolated, rural areas, whether or not their schools qualify for Chapter 1 assistance.

The term "underserved" masks differences in the characteristics of students served through the Star Schools program. As the analysis indicates, those students who are traditionally included in programs designed to reduce the risk for students who are placed at an educational disadvantage–students who live in poor neighborhoods and attend schools in which there is low achievement–receive different educational experiences through the Star Schools program from the experiences of rural, isolated students. In some ways, the Star Schools program functions in two separate manners, one that delivers supplemental instruction to elementary schools serving poor, minority students, and another that offers full courses to middle class, white students in rural isolated areas.

The two types of experiences relate to the assessment of student needs in each type of school environment. The full courses that serve rural students stem from the observation that few small rural high schools are able to offer some courses, particularly higher level mathematics and science as well as foreign languages, to students. Rural students, by virtue of where they live, are thus deprived of opportunities that their suburban (and, it is assumed, urban) counterparts have. Full courses do not rely on classroom teachers, but rather require only that an adult supervise the classroom. As a result, schools can offer courses without having teachers who are certified in the subject.

In contrast, the educational experiences offered through distance learning to students in schools serving large numbers of minority and poor students proceed from different assumptions. Star Schools projects address the perceived need to have classrooms that include challenging curricula and use the most current instructional techniques. In these classes, mainly in elementary schools, the distance learning teacher works with and through the regular classroom teacher to deliver instruction. Further, the distance learning teacher provides an instructional model that can influence teaching across all subject matter.

These differences are apparent when student and school characteristics are disaggregated by the type of distance learning experiences provided through the Star Schools program.

Characteristics of Students

Percent Minority Students Served

Almost all the schools served minority students, but the proportion of minority students varied greatly. For example, 39% of the schools served more than 50% minority students, while 61% served less than 50% minority students. Fifteen percent of the schools served only minority students, while 4% of the schools served no minority students.

The participating elementary schools served more minority students than did the middle and high schools. The proportions in the middle and high schools were in the opposite direction. Additionally, four high schools served no minority students. Table 1 depicts the number and percentage of schools serving more than 50% and less than minority students in each school level and for schools overall.

Table 1
Proportion of Schools Serving Minority Students by School Level (n = 100)

School level	Percent serving more than 50% minority students		Percent serving fewer than 50% minority students	
	n	(%)	*n*	(%)
Elementary school	28	74	10	26
Middle school	4	29	10	71
High school	5	11	41	89
Overall (all schools)	39	39	61	61

There were three K-12 schools in the sample. One served 99% minority students; one served 10% minority students; and one, no minority students.

Percent Eligible for Free or Reduced Price Lunch

Eligibility for free and reduced price lunch is a measure of school poverty. Most schools in the sample serve students involved in a free or reduced price lunch program, again with varying proportions. Thirty-four percent of the schools had over half their students involved in the free or reduced price lunch program, and 66% had less than half so involved. Only one school did not have any students participating in the lunch program.

The elementary schools served more students receiving free or reduced price lunch than the middle and high schools. None of the high schools (including the grade 7-12 school) served students with more than 50% receiving lunch benefits. Table 2 shows the number and percentage

of schools with more and fewer than 50% of the students eligible for free or reduced price lunch. Because fewer schools report the number of students eligible for free and reduced price lunch than report ethnic and racial characteristics of students, data are available for fewer schools.

Table 2
Proportion of Schools Serving Students Eligible for Free or Reduced Price Lunch by School Level (n = 60)

School level	Percent serving more than 50% reduced price lunch students		Percent serving fewer than 50% reduced price lunch students	
	n	(%)	*n*	(%)
Elementary school	14	78	4	22
Middle school	1	25	3	75
High school	0	0	38	100
Overall (all schools)	15	34	45	66

Of the three K-12 schools in the sample, one had over half of its students participating in the lunch programs, and the other two had less than half.

School Characteristics and Star Schools Activities

A clear relationship exists among the types of Star Schools activities being implemented at each level of schooling. All full courses that do not require a teacher certified in the content area are offered at the high school level. Further, the large majority of courses delivered in collaboration with a classroom teacher and are supplementary to existing curricula are received in elementary schools. Table 3 displays the numbers, content, and school level of Star Schools activities.

Table 3
Star Schools Courses and School Levels

	School level					
	Elementary		Middle		High	
Content area	Full	Supplemental	Full	Supplemental	Full	Supplemental
Mathematics		3	1		3	
Science		12[a]	1		3[b]	
Foreign language		3			12	
Social science		4			3	4
Humanities		1				1
Skills/other		3				
Totals	0	26	2		21	5

[a]Excludes one course that was being piloted.
[b]Includes one course in which a content teacher is needed.

When the distribution of courses across types of schools is considered in conjunction with school characteristics related to student ethnicity and poverty, it is clear that few minority, poor high school students receive full courses in mathematics, science, and foreign languages. Because of the nature of the data reported by NCES on the CCD tape, it is impossible to tell the extent to which these students are located in isolated, rural areas. However, the site visits indicate that the overwhelming majority of schools receiving full courses are rural. Therefore, it seems that the Star Schools Program is achieving equity objectives with regard to high school students in isolated rural areas.

The Star Schools Program's achievement of equity objectives for high school students in isolated rural areas is, however, somewhat threatened by what seems to be a trend in the number and types of programs offered. During the first two Star Schools funding cycles, mathematics, science, and foreign language courses for high school students comprised more than 80 courses offered through Star Schools programming. As of 1992-93, 21 courses were offered for high school students through Star Schools funding. In addition, two courses developed with Star Schools funding have sufficient steady enrollment to be supported by fees paid by schools. Compared to course offerings for the first two Star Schools funding cycles, math, foreign language, and advanced placement course offerings decreased by more than half during the 1992-93 academic year.

The analysis of the types of schools involved in Star Schools activities designed to be offered as supplementary instruction through regular classroom teachers reveals that they are reaching fairly large numbers of schools with minority and poor students. A similar analysis of schools' locations as performed for the full courses seems to indicate that fewer rural students have access to such supplemental instruction than do students in urban areas. These courses tend to serve students in middle and elementary schools, which are a growing arena for Star Schools projects.

Middle and elementary school programming comprised more than 50% of Star Schools programming during the 1992-93 academic year as compared to approximately 40% from 1988-92. However, the supplemental courses represent a growing number of Star Schools activities *because* of federal funding. The supplemental courses carry few incentives for schools to continue involvement if fees per student were required, as they are in full courses. Students, school personnel could argue, receive mathematics and science instruction without distance learning. Consequently, distance learning providers will need to provide evidence of outcomes that exceed what the classroom teacher alone could produce to convince schools to continue their involvement. To date, only one supplemental program previously supported by the grant is self-supporting.

POLICY IMPLICATIONS

The data indicate a clear differentiation between the characteristics of schools receiving full courses and those involved in various Star Schools distance learning activities that supplement ongoing instruction. The differences raise a fundamental policy question: Does this distribution of Star Schools distance learning opportunities reflect educational needs?

The question of whether the current distribution of Star Schools activities reflects educational needs hinges on the answer to two other questions:

1. Do high school students in urban settings have access to courses in mathematics, science, and foreign languages similar to those offered by the Star Schools Program?

2. Do elementary and middle school students in rural areas receive instruction that embraces the same standards-based reform philosophy as in the Star Schools distance learning program?

Answers to those questions are beyond the scope of this paper but point the way for future research. However, some information already exists that gives partial answers to the questions.

The National Assessment of Educational Progress (NAEP) reports regularly on the state of educational attainment in the nation. In 1993, NAEP reported mathematics results from the 1992 assessment (Dossey, Mullis, & Jones, 1993). These results were reported in two parts: "constructed responses," purporting to assess higher-level thinking; and multiple choice, involving both higher-level thinking and computation. On both measures, both extreme rural and disadvantaged urban students lag far behind their advantaged peers. Findings from the constructed response assessment indicate that at grade four, students in "extreme rural" areas have higher achievement on all scales (overall; numbers and operations; measurement; geometry; data analysis, statistics, and probability; and algebra and functions) than do "disadvantaged urban" students. Extreme rural students retain their edge through 8th-12th grades, although the gap narrows to some extent. Somewhat narrower differences favoring extreme rural students also exist on the multiple choice tests.

The NAEP findings seem to indicate that students in extreme rural areas might benefit by the type of supplementary instruction sponsored by the Star Schools Program. The need is greater in urban disadvantaged communities, but rural, isolated communities do not present ideal educational opportunities to students.

If rural students might benefit from the types of Star Schools activities in which urban schools participate, is it also true that urban students might benefit from greater access to the full courses delivered mostly to rural settings? Again, the Star Schools evaluation is unable to provide a direct answer to that question, but, again, some clues come from previous research. First, Oakes (Oakes, 1990) maintains that urban disadvantaged youth have less access to challenging courses in

mathematics and science. Further, students in urban settings are less likely to enroll in "gateway" courses such as algebra and geometry (Pelavin & Kane, 1990). It seems, however, that low enrollments exist *not* because the courses are not available but because students are tracked away from them. In short, extending Star Schools full courses to urban areas may not address the problem. Rather, solutions may be more likely to come from other policy initiatives that discourage tracking and encourage schools to challenge students throughout their educational careers.

As one step toward "de-tracking," however, the Star Schools program itself could serve as a model to other schools. As a result of the evaluation, SWRL and AAI recommended that OERI examine incentives or requirements for Star Schools grant recipients to offer *both* full and supplemental experiences equitably. Grantees could collaborate in offering a full range of distance learning experiences in both rural and urban schools. Students in schools serving largely minority, economically disadvantaged populations should have access to advanced courses, particularly if their students have received strong preparation through earlier participation in Star Schools supplemental courses. Similarly, students in isolated rural areas should have the opportunity to experience the enriched, challenging curricula offered through supplemental courses.

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